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POLICY ANALYSIS: A CHECKLIST OF CONCERNS

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FOREWORD

In September 1978 Howard Raiffa gave a talk to the Young Students Summer Program at the International Institute for Applied Systems Analysis that was recorded.

Since it contains much sage advice for systems analysts, we have obtained his permission to reproduce it as a IIASA Professional Paper so that it will be available to a wider audience.

Hugh J. Miser, Leader

The Craft of Systems Analysis

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POLICY ANALYSIS: A CHECKLIST OF CONCERNS

Howard Raiffa

Introduction

As an analyst I have participated in several policy studies; as a professor in a public policy program I have critiqued a host of such studies; and as a decision maker myself or as a consultant to decision makers I have seen how such policy studies are used or not used. As a result of this cumulative experience, I have culled a checklist of concerns in doing policy analysis that should be considered, or at least contemplated, but are frequently ignored—often to the detriment of such studies. I would like to share that list of concerns with you.

The checklist can serve other purposes. It can in a reasonably succinct way give the reader some inkling of what is meant by "policy analysis" without invoking the standard put-down: Policy analysis is what policy analysts do.

As we go through this checklist, you might want to keep in mind some prototypical policy problems: (1) US energy policy, (2) environmental protection policy, (3) drug addiction policy, (4) juridical-penal policy, (5) welfare policy, (6) siting power plants or airports or dams, and so on.

Also, as we go through this list keep in mind that I am not calling for a cook-bookish, linear, sequential attack on every problem: First you do this, then this ... then this. That's not the point. The *order* of the topics listed below is not nearly as important as the sweep of the coverage and the need to cycle and recycle through many of the issues raised, progressively becoming more focused and more penetrating in successive iterative stages.

And I must admit at the outset that, when I scan this list and see how it stacks up against a brand new policy problem, I often find that some idiosyncratic features of the new problem are simply not captured by any point on the existing compendium of concerns. Thus each new problem can proliferate new concerns to add to the list, and although I have done quite a bit of this in preparing the present version of the list, I have resisted the temptation of just adding more and more to an already large list. The point of this message should be clear: The list is not complete, nor do I think it is complete, nor have I tried to make it complete. Still, I hope it will be useful.

Let's imagine that you have been asked to initiate by yourself or with others a study that will purportedly determine someone's policy. What should you start thinking about?

1. Initiating the Analysis

Why has *this* problem been selected for study and analysis? Why not some other problem? Why now? Has there been a critical action-producing event that has triggered the need for or the desirability of this study? Who is supporting the study? Do they have a hidden agenda? Do you? Are the sponsors using you for ends that are in conflict with your values? How free is the scope of the analysis? What are your obligations if you start the analysis?

How were the analysts selected? Is there a bias in this selection of analysts that will interfere with the acceptability of the findings? Does it make sense to do an informal analysis of whether formal analysis should be done? Are the potential benefits of the study worth the efforts? Can talents be better used elsewhere?

Is the proposed process of conducting the analysis appropriate? Will analysis help or hinder a solution?

Is the analysis being done to help make up minds or to sell a predetermined conclusion? (Both may be legitimate pursuits, but it's nice to know which holds in a particular case.)

2. Background of the Problem

What are the issues? ... the real issues? Has anyone written these down? Have previous studies been conducted? Are you better off studying these previous studies or starting fresh? Why have previous studies been ignored or the recommendations not implemented?

(Note: The points listed below will help to structure the problem and to fill in details in the background of the problem. However, thrashing around a bit with no structure in mind while trying to get an overall "feel of the problem" is a reasonable starting point.)

3. Bounding the Problem

There are two polar extremes: being too narrow and being too broad. It's a truism that everything interacts with everything else, and if you want to be all-inclusive, every study can deteriorate into a study on the Overall Quality of Life.

For example, you cannot do a serious study of US nuclear energy policy without considering the issues of energy policy in general, and without considering how US energy policy interacts with US foreign policy, and without considering problems of the proliferation of nuclear weapons. But you may want to exclude consideration of human rights in Chile, although I dare say it would not be difficult to give a chain of arguments that would inexorably lead to that consideration.

A few years back I heard a perfectly reasonable seminar talk on the optimal location of firehouses in New York City. A critic in the audience argued that the speaker missed the point: The problem was not how to put out fires but how to prevent fires, and this in turn was a problem of the housing stock in NYC. Not so, argued others. It was a problem of the maldistribution of income and of a deplorable economic system. And so on.

It is easy to be pushed into being too broad in scope. There is the opposite danger of being so narrow in an analysis that optimization in the small is counterproductive. Horror stories abound on the misuse of suboptimization. The artistic trick is to carve out a tractable, meaningful morsel to digest ... not too small, not too large ... just right. The process of bounding the problem must be an iterative one and cannot be divorced from the ensuing analysis.

4. Institutional Decision Network

Who is (are) your client(s)? To whom is the analysis addressed? Who has to decide what? ... when? If some recommendation has to be implemented, who are the implementers? Who has to be convinced? Who are the influencers and who has to be influenced? What is the process for getting things done? ... for moving the bureaucracy? Many studies are never implemented because they are not addressed to the right people; others because they have not involved the right people in the process of the analysis.

Are you addressing the problem that interests your client or the problem that interests you? Many studies do not touch base with their clients during the process of the analysis. The attitude is, "We want to wait until we have something to say." Well, don't be surprised then, that what you finally do say does not address your client's perceived problem. Another nonimplemented study to add to a defunct library.

5. Impacted Individuals and Groups

Who will suffer from or benefit from the consequences of the decisions? Who are and who should be the concerned parties or groups? Are there natural groupings that polarize on the issues involved (e.g., labor-management, poor-rich, industry-environment, urban-suburban, city-farm, east-west, industrialized countries-LDCs, present-future generations, etc.)?

In tallying up the gains and losses of a proposed policy, the analysis must balance between efficiency and equity. Efficiency is roughly concerned with the total of all benefits and costs (added up over all impacted individuals); equity is roughly concerned with the distribution of these benefits and costs. More about this later.

6. Generating Policy Alternatives

One part of any analysis is to compare choices (i.e., policies or decisions) that are already on the standard menu. Another task is to creatively concoct new choices. Many times, when asked whether I prefer A or B, my first question is, "Why can't I have both or a mixture of both?" If analysis shows that A is better than B on certain criteria and worse on others, then the analysis itself might serve to suggest a compromise C that, on balance, is better than A or B. To me, this is the greatest contribution that analysis can make: Creative generation of good alternatives.

All too often, I am sorry to admit, analysis is stifling and inhibits creativity. The analyst often is more concerned with applying a limited set of formal tools and he ignores alternatives that defy simple analysis. Or, he might be so preoccupied with doing esoteric analysis on a predetermined set of alternatives that he does not expend adequate time or effort on thinking imaginatively about new alternatives. Notwithstanding all this, I firmly believe that analysis has a role to play in seeking good new alternatives for review and that this should be one of its primary missions.

7. Sequencing Decisions

What choices must be made now? What choices can be made later? What's the advantage of maintaining flexibility and keeping options open? In general, what is the chronological sequencing of decisions to be made, and is there flexibility in this sequencing? Can later choices be made dependent on information to be gained in the interim? If this is possible, should we systematically consider ways of obtaining information (e.g., by experiments) that can influence later choices? Are the expected benefits to be derived from additional information commensurate with the costs of obtaining this information?

All too often, analyses set forth dynamic master plans: This is what we plan to do now, this in 1985, this in 1995, ... These master plans are often too rigid: They do not take into account the possibility that information gained along the way may alter the desirability of various future choices. The environment (be it social, political, technological, administrative) as it is observed to evolve over time could influence the menu of future possible choices and their comparative desirabilities. Prudent analysis should try to anticipate a range of possible future changes (as long as this is not too far into the future to be ludicrous) and to incorporate contingency reactions in the strategic plan.

8. Centralized vs. Decentralized Processes

There may be flexibility in the choice of the decision-making unit ... in deciding *who* has to decide. In a hierarchical organization, should final action be taken at the top or should the top circumscribe the set of action possibilities that can be considered at a lower level? Of course, these problems raise vexing questions (fascinating to the analyst) of incentive compatibilities, of distortions of information flow, of reward and punishment schedules, and so on. Should we let the free market work? Should we regulate the market centrally because there are inherent market imperfections or because there are no mechanisms for firms and consumers to incorporate within its cost structure the external harm

they cause to others? Should a government agency control the final choice, or should it merely change the rules of the game for the players and let their self-interested, interdependent actions determine the societal choice?

Although the above concerns about "Who should decide?" are fundamental to many policy studies, they are all too often not even considered. This topic obviously is related to 3 (bounding the problems), to 4 (institutional decision network), and most importantly to 6 (generating policy alternatives).

9. Comparative Analysis

Is the problem you are facing unique? How have similar institutions (firms, agencies, cities, states, countries) handled the same problem? How can you learn from the experience of others? Often sophisticated statistical techniques can be exploited to partially overcome the annoying fact that other environments may be different than your own. Cross-cultural, cross-temporal, and cross-environmental comparisons are tricky, and although they may not be definitive, they should certainly be suggestive.

Besides looking at what roughly similar institutions have done about your problem, you might also want to look at what your own institution has done about roughly similar problems.

10. Multiple Conflicting Objectives

Complex problems usually involve multiple conflicting objectives. Is the set of objectives you have identified for the study reasonably comprehensive for decision purposes? Is each objective clear enough so that you can compare the consequences of various policies (decisions) on that objective? The question you shall eventually face is: What are you trying to do? or, What are you trying to optimize? The formulation of a suitable objective function is not an easy task and many studies falter on this issue. Doing right by one objective may be at the expense of another objective. There is no magical way of simultaneously optimizing on all objectives. Tradeoffs will have to be made. But prior to making any attempt, either formal or informal, at weighting and combining many objectives into a composite overall objective, it is critical to know what the basic component objectives are and not to ignore important facets of the problem.

As an illustrative example, consider a study on US Nuclear Energy Policy. A set of objectives might be organized around the following broad categories of objectives:

- Economic factors (to government, to consumers, to industry)
- Environmental factors (use of land, air, water; depletion of natural resources; environmental aesthetics)
- Health factors (mortality, morbidity, psychological comfort; effects that are acute, delayed, chronic, genetic)
- Safety factors (... from normal operations, ... in case of natural accidents, ... in case of deliberate accidents (sabotage))

- Socio-political factors (e.g., civil liberties, domestic security, world stability, energy independence, nuclear weapons proliferation, alienation from society, international treaties, ...)

Objectives at any level may be composites of subobjectives and these subobjectives may have to be articulated as a way of elaborating the meaning of a higher-level objective.

Ideally, it would be nice if each possible consequence of a policy could be "scored objectively" in terms of how well this consequence fares on a particular objective. But subjective rankings on crude measurement scales may have to suffice. There is a tendency, which must be deplored, to ignore important objectives because they are difficult to evaluate numerically; thus, important fragile values (e.g., aesthetics, or importance of ethical traditions) may be ignored and undue weight given to factors that are easily quantified.

Not only should a good policy analysis keep its eye on a relatively comprehensive set of objectives, but it should also note the distributional effects of these objectives on the full set of impacted individuals and groups (cf. item 5).

11. Temporal and Intergenerational Concerns

I have already mentioned a need to consider distributional (equity) concerns: Does A's gain offset B's loss? A special case of this occurs if A is the present generation and B a future generation. Abstractly, a concern for intergenerational equity is just another problem of conflicting multiple objectives. But it is a particularly vexing one, where values differ widely. What does this generation owe to future generations? Does it make sense in social projects to discount future benefits and costs? How about future environmental benefits? Should this be discounted? What about changing tastes and values? How paternalistic should we be toward future generations? Although there is no hard consensus about the answers to many of these questions, there is a consensus that these questions are relevant and should not be ignored.

12. Uncertainty Analysis

What are the critical uncertainties of the policy problem? What information is now known about these uncertainties? Who are the experts? Do they agree? Do these experts have conflicts of interest because of their roles? How well have these experts calibrated over time?

How volatile is our information about these uncertainties? Are there critical events that might occur during the time frame of the problem that could drastically shift our assessment of these uncertainties? Is it worthwhile stalling for time before an irrevocable commitment is made in order to gain more information about these uncertainties? Can effort (and money) be expended to gather information (e.g., run experiments, collect data, etc.) that could modify probabilistic assessments enough to alter action? It is the unfolding of information about these uncertainties over time that is often critical for dynamic decision analysis.

Uncertainty analysis can either be done informally in lay vernacular or can be done in a more formal way using a probabilistic calculus that attempts to be precise about the imprecise. Although my biases are towards the formal side, I would far rather do informal analysis than blithely ignore critical uncertainties.

13. Irreversibilities

We are all familiar with physical (biological, climatological, ecological, ...) irreversibilities. "If just one more pound of junk is deposited in this lake, it will simply die and you can kiss it goodbye." Physical tipping processes are often recognized. There are, however, other irreversibilities: political and managerial. If Mr. X commits himself to Q, then he will not be able to back down; the institution will be locked into a long-run administrative irreversibility. If Mr. Y sinks all that money in capital equipment, he's going to use it ... regardless!

But often decisions that cause so-called irreversibilities in one time frame are really reversible in a longer time frame. Sometimes "irreversibilities" are really "delays" and we may have to be more precise about the time factors.

So, be wary of irreversibilities (strict and partial) whether they be physical, political, administrative, or managerial. But remember also that irreversibilities can work for you as well as against you.

14. Dynamic Modeling of Interactions and Interdependencies

In an attempt to ameliorate the adverse effects of one problem, decision makers through their actions may unknowingly, but not uncaringly, exacerbate other, perhaps far worse, problems. For any proposed action it is important to consider the possible dynamic effects that may ripple through the system because of the action chosen. The analyst must consider not only primary but secondary and tertiary effects. Since experimental laboratories (like wind tunnels) are not commonplace for most policy problems, the analyst has to resort to paper and pencil or computer-based models that attempt to partially mirror reality and to use this synthetic laboratory to investigate "what-if" behavior.

In modeling reality for policy guidance there are a host of options to consider. First of all, some advice: Beware of general purpose, grandiose models that try to incorporate practically everything. Such models are difficult to validate, to interpret, to calibrate statistically, to manipulate, and most importantly to explain. You may be better off not with one big model but with a set of simpler models, starting off with simple deterministic ones and complicating the model in stages as sensitivity analysis shows the need for such complications. A model does not have to address all aspects of the problem. It should be designed to aid in understanding the dynamic interactions of some phase of your problem. Other models can address other phases.

Time constraints, however, may not allow you the luxury of tailoring models to fit your problem. You may have to choose a model off the shelf, so to speak, and fiddle with fitting it as well as possible to your problem. But in these cases my advice is even more cogent: Keep it simple.

If a variable is incorporated in a model and it can affect and be affected by other variables, it is called "endogenous" to the model. If a variable lies halfway out of the model in the sense that it can be externally manipulated and it can affect other variables but not be affected in turn by them, then it is said to be "exogenous" to the model. The complexity of models depends in part on what variables are left out of the model altogether, what are made exogenous, what are made endogenous, what relations are deterministic and what stochastic (probabilistic), what mathematical interconnections are causatively related in a sequential order and what are simultaneously interrelated through a system of functional relationships, and so on. There are all kinds of models and, like physicians, modelers specialize. So don't expect profound insights into an econometric model from a specialist in queuing models, etc.

One last bit of advice: Beware of the physical scientist who tries to adapt physical models for social phenomena. He is usually hopelessly naive.

15. Interdependence with Other Key Policy Decisions

A caricature of the considerations I would now like to mention here is the orthodontist who puts an awful contraption into the mouth of a youngster to straighten out his bite. When concerns are expressed about what this is doing to the psyche of the child, he retorts: "I am a specialist in bites. Let the child's psychiatrist straighten out his mind later." Well, we might straighten out our domestic energy problems but do it in a way that will make our foreign trade problems more crooked than ever. These are examples of the dangers of suboptimization—solving one problem at the expense of another.

But in many circumstances the orthodontist may be right. On balance a straightening of Johnny's bite along with a slight "unstraightening" of his mind may be better than the status quo. Similarly, it may be worthwhile to partially foul up our foreign trade problem to bring some order in our domestic energy problems. The important point is that the analyst should be aware of these potential tradeoffs, and he should expect biased responses from experts whose primary concern is on one facet of a complex problem.

If we are concerned about the interrelations between problem A and problems B, C, and D, why not incorporate them all into one big problem Q? The trouble is that analysis of Q may not be tractable (see 3 on bounding), and models addressed to Q might be far too complex (see 14 on modeling). Problem A might get swamped by formal, simultaneous consideration of B, C, and D. Another tack is to attempt to incorporate some of the most basic concerns of problems B, C, and D into the multiple objectives listed for problem A (see 10 on conflicting multiple objectives). Still another tack is to proceed iteratively—to ignore B, C, and D initially and concentrate on A—to examine informally the effects A's policy might have on problems B, C, and D and then to impose further constraints on A's policies to address the destabilizing influences on B, C, and D. All these possible ways of coping with the problem of interdependence are related to one another, and what should be examined formally or informally is a matter of taste and convenience. But the message should be clear: Don't complicate someone else's problem needlessly in solving

your own. At least be aware that you might be doing this.

It may not always be politically or administratively possible to address some crucial problem that desperately needs analytical attention. However, it may be possible to back into a study of this problem because it is related to another problem that can be addressed. The trick is to use the excuse of working on a relatively unimportant, ephemeral problem to solve a related, much more important, long-run problem. The interdependence of problems can offer an opportunity as well as an analytical complication.

16. Distributional Analysis

Topic 5 focused on the parties (individuals, groups, and institutions) who might be impacted by the decision to be taken or who might be concerned about the decision for ethical or ideological reasons. Analyses should not ignore these parties, for they may deserve to be considered or they may be influential enough to hinder or to block a solution. What does the analysis look like from the perspective of these related parties? What are the potential distributional tradeoffs? Can party A's lot be improved without causing undue harm to B or C? Although monetary transfer payments from B and C to A might not be possible (say, for institutional reasons), perhaps policies that would shift the distributional benefits and burdens might be suggested as a result of a better understanding of what is in the actual and perceived interests of the parties. Perhaps not. For example, if an agency is considering where to locate a highway, there may not be any easy way to avoid displacing persons from their homes. But a highway-location problem might be coupled to a housing problem, and in the broader problem context it might be possible to ameliorate partially the harm to be done to the displaced group.

[This discussion brings us back to the question of bounding a problem (see 3) and to the need for iterative analysis. It also emphasizes that one reason for coupling problems (see 15), even if they are somewhat independent, is to facilitate distributional adjustments. Also, our present discussion harks back to topic 6 on generating (imaginative) policy alternatives (compromises).]

One maxim, rephrased slightly, goes as follows: "Thou shalt not do direct (apparent) harm (to any identifiable group) ... and expect to persevere." The art of policy analysis involves weighing the interests of many groups in order to know what can be done and what is reasonable to give away in the spirit of compromise.

The noble quest is to seek "joint gains"—to move from the status quo to a policy where all impacted groups perceive themselves as gaining. This is not an empty dream in many instances because the status quo may be so awful, and in cases where tastes and opinions differ it might well be possible to maneuver in directions that please all.

But also let's keep in mind that trying in each problem, however small, to achieve distributional equity at the expense of efficiency may not be in the best interests of the society—even of the disadvantaged part of society. It might be better to tote up all the distributional gains and losses accruing from many problems and then to make overall grandiose compensating corrections (e.g., an income tax adjustment).

17. Analysis for Bargaining and Negotiations

Suppose you, as an analyst, are a member of party A that has to negotiate with party B. The purpose of the analysis is to help your negotiator represent your side as effectively as possible by squeezing the most possible out of the bargain with B, or possibly by breaking off negotiations if no deal is acceptable to your side. Suppose there are many factors to be resolved. The art and science of negotiations is an age-old topic and erudite tomes have been written on it, but here, nevertheless, are a few reminders:

- The concerns listed above (1 to 16) are still relevant, with the negotiating context in mind.

- Know thyself. What do you (party A) want? What are your value tradeoffs? Remember that during negotiations your side does not control fully what tradeoffs will be raised. What is your walk-away or rock-bottom position—your cutoff point, where, if you have to settle for less, you simply won't settle?

- Know thy adversary. You can't know your adversary as well as you know yourself, but a little thought about his concerns might go a long way.

- The negotiators will have to probe for "joint gains" and some *partial* disclosure of your values may be absolutely necessary in order to expand the variable-sized pie that is under contention. But if you disclose your walk-away position too readily, you may be in a disadvantageous position in dividing up the pie.

- The art of making concessions (of magnifying the perceptions of what you're giving away and of minimizing the perception of what you're getting), of opening gambits, of behaving cordially, of making threats, of backing down gracefully from previously announced irrevocable positions, and so on, must at least enter into the conscious thinking of the analyst as well as the diplomat. All these factors and many, many more must be thought about and so are part of the policy analysis.

- Joint analysis done by both sides, or analysis done by party A with all details disclosed to party B, may help to increase the size of the pie, but it also might make the process of dividing the pie more divisive. Often creative obfuscation is better than penetrating clarity for achieving compromise.

- In policy analysis for bargaining and negotiations, the parties are rarely monolithic. What the State Department wants from an international treaty may be vastly different from what the Defense Department wants. Most negotiations have an internal component as well as an external component, and the complexity of the external component is often trivial in comparison to the internal component.

If policy analysis is what policy analysts do, and if we add up all the hours that have been spent on analyses for bargaining and negotiating, then we must conclude that we cannot ignore this sizable chunk of the discipline we're discussing.

18. Interactive, Competitive Analysis

Suppose that you have to give advice to a client whose subsequent actions will only partially determine an outcome—the actions of others, who have their own interests at heart, also matter. Hence you and your client have to think what the others might be thinking, and they are doing the same. The theory of games does an exquisite job of balancing simultaneously the profound, iterative thinking processes of the players in this type of interactive situation, and in some highly structured problems the theory can simultaneously suggest strategies for the players that are in equilibrium—that is, the set of suggested strategies is such that no player has an incentive to discard his strategy as long as the others do not deviate from their suggested strategies. The essence of game theory is that each player must think about what the other fellow is thinking about what he is thinking about ... and so on, ad infinitum.

The trouble is that in complex, real-world problems there are usually so many idiosyncratic, nonrational elements involved that what you think the other fellow is thinking may not at all be related to what he is actually thinking—it may not even be in the same ballpark—and to think what he is thinking about what you're thinking, especially when you're thinking about problems he would not even begin to fathom, becomes a bit ludicrous.

The message I want to convey is not that you should not try mentally to put yourself in the other fellow's shoes, but that you must hold the fantasizing down a bit. Perhaps you should, as best you can, judgmentally assess probabilities for the actions he might take and counteract accordingly. Granted that this advice might not be clearly operational in some circumstances, I still think it's worthwhile for you to try to think this way. Many of you will think I am thinking wrong, but, I think your thinking about my thinking is wrong.

Another bit of advice: Analysts often make fundamental errors when they take a static view of a competitive situation and ignore the possibilities of various forms of tacit collusion and cooperation that can be exploited when interactions over time are properly considered. Often myopic maximization by all parties in a controversy might lead to an abysmal outcome for all. So here is a special plea that you should not do fancy analysis of the wrong problem.

19. The Aims of Analysis and Noncontroversial Elimination of Noncontenders

The final aims of analysis may be manifold, but let's look at just two:

1. The aim is to eliminate clearly inferior policy alternatives by making relatively noncontroversial value judgments and to present the pros and cons of the remaining contending alternatives in a way that will allow the decision maker to do the final syntheses informally and privately.
2. The aim is to suggest a best policy and possibly an alternate best policy.

The latter aim will require many more difficult and perhaps politically delicate tradeoff questions than the former. But, even if the aim of the analysis is to select a best strategy (aim 2 above), it may be desirable to go through stage 1 first. Often at stage 1 it may be clear that the problem needs to be reformulated; or you may find out that one strategy is too crude and it should be elaborated in terms of two distinct strategies; or you may find out that some attributes do not differentiate among the alternatives enough to warrant attention; or you may find out that some attributes are clearly missing and must be added to the brew. A pause at stage 1 will let you interact with the decision maker(s); they and you can test whether you (as analyst) really understand and have captured the essence of the problem. They (the decision makers) will better understand the intricacies in going from a stage 1 analysis to a final decision, and they may (perhaps at your suggestion) seek help in sorting out the conflicting values in their own minds. Stage 1 may help sensitize the decision maker (2) to the need for more intricate and profound value tradeoffs.

a. Simplifying and Aggregating Output Measures

There may be many way stations between stages 1 and 2. At stage 1 you may have gotten rid of noncontenders by imposing relatively innocuous value judgments (e.g., preventing a case of blindness is more important than preventing five cases of the measles, or saving the lives of two individuals in their prime years is better than saving one nondistinguished octogenarian). It may be possible to elicit from your client some important and perhaps tough tradeoffs without forcing him to the wall by asking really rough, emotionally-packed questions, such as, "How much would your agency spend to save a life of this category?" It might be possible, for example, to collapse several morbidity indices into an overall morbidity index, or to collapse a time stream of benefits by some discounting techniques.

To be a bit more precise, suppose that at stage 1 each remaining contending strategy can be evaluated in terms of 20 indices, say. But of the 20 indices, suppose that 8 of them are of a similar type (e.g., all morbidity indices). It may be possible to collapse these 8 related indices into one composite index, or perhaps two composite indices. By simplifying groups of related indices it may be possible to evaluate each strategy in terms of 5 composite indices rather than the original 20. It may now be apparent that additional strategies can be ruled out as noncontenders. With fewer contenders, each having a simpler score card (5 rather than 20 evaluations), the problem may now be a lot clearer for the decision maker(s) to intuit about. Once again, however, it may be desirable to refine some strategy further and split it into two or three separate strategies. As you simplify you can also afford to elaborate.

b. Breakeven Analysis; Sensitivity Analysis; a Partial Structuring of Hard Tradeoffs

Suppose that analysis leads us to a point where there is just one awfully difficult tradeoff rate to make? Should the tradeoff rate be 3.5 to 1 or 3.7 to 1 or even 4 to 1? Questions like this can often be sidestepped by doing *breakeven* analysis. For example, analysis might show that

policy Q can only be retained as a contender if the tradeoff rate in question is 5.3 or more to 1. Now, without forcing the decision maker to commit himself to a preference for 3.5 or 3.7, it might be amply clear that the rate is nowhere near 5.3 and so Q can be eliminated.

When a few critical variables (e.g., tradeoff rates or probabilities) are pivotal in making a final choice, the analyst can also take some burden off the shoulders of the decision maker by doing *sensitivity* analysis. Instead of pressing for crystal clear numbers for the variables in question, the analyst can seek a set of pragmatic, rough, and reasonable numbers and then systematically investigate what happens to the conclusions of the study when these numbers are perturbed in a reasonable range.

It may happen that the breakeven and sensitivity analyses might suffice for decision purposes without there being any need for the decision maker to make horrendous tradeoffs (e.g., dollars for lives). But perhaps it might not suffice. Life isn't always easy, no matter how ingenious you may be.

There are two observations I would like to make before taking leave of this topic. First, one secret of analysis is to divide and conquer; to decompose a complex problem into parts in such a manner that each part can be analyzed without the interference of too many interactions from the other parts of the problem (e.g., to decompose judgments about the uncertainties of a problem from judgments about value tradeoffs). Second, more egregious mistakes have been made by completely ignoring various important aspects of a problem than by incorrectly adding up the bill of perceived costs, benefits, and risks.

20. Disagreements among Experts

A colleague once told me that when one of his kids took ill, his wife and he first decided whether they thought their child needed an antibiotic and only then would they call in the appropriate doctor whom they knew would be almost certain to prescribe as they thought appropriate. Not only do doctors disagree, but on almost any scientific issue it is possible to find experts who will take any side of the issue.

It's easy for a decision maker who seeks advice to fall into two traps. One is for him to pick and seek advice from a group of experts who happen to agree with each other; and after hearing these experts reinforce each others' biases, he may be led to believe that the common wisdom of his small subgroup is the common wisdom of all. Second, he may pick a group of experts who are purposely chosen because of their diversity of viewpoints, and after hearing them talk past each other in an emotional nonexchange of information, he may conclude that there is absolutely no consensus when, in fact, there may be a great deal of consensus in the larger community. What is worse, he may believe that, since the experts don't agree, he can blithely ignore these technical issues.

Of course what the decision maker should be seeking is a balance between these extremes. He should be exposed to different viewpoints, but he should try to understand the forces and conflicts of interest at play that cause some scientists to hold one viewpoint and others another. If the experts can't agree on policy-related conclusions, can they at least agree on what they disagree about? Is it a matter of disagreement about

probability assessments or about basic value tradeoffs or about attitudes towards risk?

If disagreements about probabilities are involved, someone should at least try to find out what disagreements are fundamental and what are derivative. Can disagreeing experts at least agree on certain probabilities if they are conditioned on some clear underlying hypotheses? Can uncertainties be modeled, dissected and assembled in a way to highlight fundamental agreements and disagreements? Can experiments be performed or data collected to give further objective evidence about these disagreements? Do the experts at least agree about the relevance of further data collection?

Often disagreements about values are in reality disagreements about probabilities, and it is important to know whether this is the case. Let me explain. For example, two experts might agree on really fundamental values—on how they would trade off various morbidity or mortality indices. But the output of a study on air pollution might involve various physical measurements on air quality. In order to make tradeoffs between one ambient air quality measurement and another, each expert would have to think of the linkage between air qualities and health, and they might disagree about this probabilistic linkage and this gets translated as a value-disagreement about the proxy measurements involving air qualities.

In a collegial inquiry where experts are sincerely groping to find a "group" solution, it is important to understand why disagreements exist. The decision maker, or an impartial analytical group acting for the decision maker, may not be able to dispel these agreements, but if someone has to choose sides it is sometimes helpful to know the root cause of the disagreement or at least to know whom else to call to guide the decision maker through the maze of intricacies.

21. Accountability of the Decision Maker

Decision makers are more likely than not to be rewarded by the perceived, *ex post* quality of the outcome of their actions rather than the objective, *ex ante* quality of their decision-making logic. This is natural because reviewers can partially monitor outcomes, but more often than not they cannot be privy to the details of the decision-making inputs. And, just because this is a natural state of affairs, there are conflicts of interest that arise that place decision makers in awkward positions when they try to balance their own interests with the public interests. This problem is not peculiar to the public sector. In any hierarchical, decentralized organization there is often a conflict of interest between lower-level managers, higher-level managements, and the organization as embodied by the collective interests of its owners. Partly this arises from the way decision makers are evaluated: by outcomes of decisions rather than by the quality of these decisions.

In decisions that are taken in the face of uncertainty, it is often prudent, courageous, and wise to choose an action that is more likely than not to lead to a poor outcome because any alternative act may have a small probability of having a really disastrous societal outcome. If the decision maker is going to be rewarded solely on the basis of the

outcome, however, he may be sorely tempted to maximize the chance of a positive personal reward—even though this action may have deleterious societal possibilities. In risky situations, it is especially important that improper incentive, reward, and evaluation structures not force decision makers into taking actions that are at variance with the interests of the organization that the decision maker purportedly represents.

As the squeaky wheel gets the oil, the *identifiable* recipients of an action get the attention. An action taken to save the life of a girl caught in a well has a different and stronger appeal than an action that will save several anonymous, statistical lives somewhere out there. And it would not make much difference to some if the girl had a dreaded disease with a considerably shortened longevity. People identify with identifiables; they do not with nonidentifiable anonymities. Public decision makers are held accountable by the public, and they in turn hold themselves accountable for effects to identifiable recipients. If a contemplated decision can directly impact an identifiable group (either beneficially or adversely), this group can organize and appeal to the public and make the decision maker accountable. Others—many more, perhaps—might be affected by the decision, but they may not know who they are *ex ante* or even *ex post*, and no voices may be heard to protect their interests.

A decision maker usually is held accountable for the *direct* impact he causes but he may not be held accountable for the *indirect* secondary and tertiary effects that occur because of his policy intervention in a dynamic, interactive system. Again the group that is directly affected may be more identifiable than the anonymous mass of people whose lives are only indirectly impacted. But the decision maker and his analysts may have a special ethical responsibility to represent the interests of the unheard statistical mass. Numbers may not count to the public—"one life is just as important as hundreds"—but they certainly should count to the responsible decision maker and analyst. The trouble is that there may be a conflict between what is right in the perceptions of the voting public who identify with identifiables and what should be right in the eyes of the decision maker. Accountability is usually held to be a good; it could also be a bad.

22. Resilience of the System

Heavens, I'm all for analysis! But analysts, as a breed, are often too dogmatic. In retrospective reviews of past decisions taken, there are just too many surprises encountered—surprises that are not even remotely hinted at in the analysis. Hence, thought should be given to ways of accounting for the unaccountable, for protecting the resilience of the system from the completely unexpected. Instead of putting all one's effort into trying to get a "fail-safe" system, some effort should be reserved for a "safe-fail" system. This philosophy is most often enunciated by ecologists who clamor for redundancy, diversity, variability, and heterogeneity in environmental systems, so that when a comet from outer space or some equally remote occurrence befalls, the system can absorb the shock. Now here, as in all life, balances must be struck. If we become so

¹A direct plagiaristic steal from Buzz Holling, my ecologist friend.

paranoid that all we wish to prepare for is cataclysmic disaster, we shall have a distorted allocation of effort. All I am trying to say here is that we should not completely ignore the pleas of the ecologist: Don't be too surprised that something surprising will happen; give some thought about the *resilience* of the system.

There are those who see strength in diversity, even if this diversity is at the expense of efficiency; others are bothered by the hodge-podge of diversity and they yearn for a more rational alternative: Seek out the best alternative and impose it uniformly throughout the society. But really rational, sophisticated analysis should not ignore the need for dynamic stability, and this can often be better achieved through diversity.

23. Private vs. Public Documentation

Decisions are often taken for reasons that are not shared with a broad audience. Sometimes these reasons are for crass, self-interested motivations that in no sense can be interpreted as being in the broader interest of society. Almost every best-seller novel dwells on this theme. Other times a decision maker may sincerely believe that his actions are in the public interest but it would not be prudent to disclose some of the true reasons for his actions. First, these reasons might needlessly hurt others; second, the reasons might needlessly exacerbate other related problems; third, the reasons might be difficult to explain and subject to politically motivated misinterpretations; and so on. It is not difficult to concoct examples where the decision maker refuses to publicize his true reasons for an action when, in his opinion, full disclosure would be to his personal benefit but not to the benefit of society. But, of course, the decision maker who sincerely wants to protect the society from the adverse effects of full disclosure may be wrong in his reasoning. If this reasoning is not shared, then where are the adversarial checks in the system? And what about the process itself? Secrecy and lying (even for noble purposes) may contribute to general distrust and alienation in the society and finally to a gradual subversion of the system by the ignoble. These sentiments make me feel good when I write them for I am on the side of righteousness. But, still, complete honesty in analysis is a hard ideal to strive for. I am not thinking here so much of distorting facts in public documents (which cannot be condoned) but of not disclosing all critical facts. For example, a formal analysis might choose not to include political objectives in the hierarchy of objectives to be examined. A justification can be made that political concerns are hard to formalize and should be folded into consideration in an informal, nonstructured way. Of course, this also *means* less public disclosure of the basic reasons for the action.

As stated earlier, much of policy analysis is done in preparation for, or during, negotiations. If other negotiating parties are privy to your real tradeoffs, to your walk-away or reservation limits, or to the internal inconsistencies of your all-too-nonmonolithic position, then you can be manipulated adversely. Stretching the truth is part of the strategy of negotiations and full, honest, open analysis may not be in the interest of your side.

There are no easy solutions. But I have posed the issue of disclosure as an all-or-nothing dichotomy, and since this is not the case there is room for compromise. If some analysis cannot be fully disclosed to all, then at least it might be disclosed to a selected few who are chosen to keep the system honest. Now, who should select those few? Ah, this gets too involved.

24. Advocacy

Suppose that you as analyst (or decision maker for that matter) are convinced that policy Q is best. You may still have to convince others that you are right. Unfortunately, a full balanced disclosure of the analysis that led you to Q with all its pluses or minuses may be interpreted by outsiders as an admission of the weakness of Q's dominant position. You don't necessarily win points in a debate by marshaling the arguments for your opponents against your own best position. But this does not necessarily mean that you must lie; just emphasize the positive attributes of Q. Documents that are designed to convince yourself may unfortunately not be appropriate for convincing others—especially when the others think that your neutral analysis is not really neutral, but has already been doctored to win over friends to a preestablished position.

In cases where there are multiple, conflicting objectives—the usual case rather than the exception—it is rare that the policy you deem best overall will dominate others on all objectives; it will be better on some and worse on others. Both sides in a debate tend to emphasize the objectives that are favorable to their preferred policy alternative and the disputants rarely engage in a debate about tradeoffs across objectives. Occasionally, and this is rare, really balanced presentations do win converts. But if you start off with a balanced presentation and are confronted with a strident counterattack, you may simply be forced to emphasize the positive and deemphasize the negative aspects of your most preferred alternative. That's life, so be prepared.

A decision maker who is about to announce his best alternative policy Q will be well served if he can anticipate what the opposition might say. What are the three (or four, or five, ...) best counterarguments against Q and what are some good counter-counterarguments. Perhaps if you can't think of good counter-counterarguments you might want to review your preferred position.

I am not calling for more time being spent on public relations than on substance. But all too often insufficient attention is paid by analysts to the closing steps that are necessary in getting a policy adopted. This means the preparation of advocacy documents, news releases, briefings, public meetings, and molding public perceptions. Analysts are not usually involved in selling programs, but in selecting programs. But selection of an advocacy strategy is also partially amenable to analysis. Sure this can serve evil purposes; but your aim should be to use your analytical advantages to serve your (hopefully) noble ends.

25. Implementation

Now that you (and your client!) have gotten Q adopted and have won over the hearts (and votes) of the public and have split the potential blocking coalition, your team must implement Q. Once again the selection of an implementation strategy is not usually thought of as an analytical function. But why not? Choices have to be made; uncertainty, as always, abounds; tasks have to be delegated; information channels created; and incentives and rewards established.

Of course different skills come into play in the advocacy and implementation phases of a program than in the selection phase, but my point is that the analyst might still be profitably exploited. And what's far more important: If program Q cannot be sold and implemented, it should not have been selected in the first place. It may be counterproductive to artificially divorce advocacy and implementation from policy determination. The lines should be blurred.

26. Evaluation

Those who determine policy and then have to sell it and implement it are not always in the best position to evaluate that policy when it's put in practice. There is a vital need for independent groups, free of the taint of prior commitment, to monitor performance; to design controlled experiments; to collect, analyze, and interpret data; and, in short, to evaluate programs in order to determine whether the public has been oversold. This establishes accountability and is part of a system of checks and balances.

But ongoing evaluation also serves another end. Programs have to be fine-tuned. As time progresses, past uncertainties may now be converted into relative certainties—or, more generally: with the accumulation of relevant information, formerly held probability assessments of uncertainties may now have to be revised and updated—and reassessments of future pending choices must be made. New options, not formerly envisaged, may now be politically or administratively possible. The controlling administrators should be thinking about opting out of poor programs, cutting losses, expanding successes, combining separate programs, splitting apart a single program, and about designing controlled experimental studies not just to keep the system honest but to help squeeze out the best of an already adopted program. Of course, as you might expect by now, it is my belief that analysts once again should get into the act; but here, as before, analysis in a formal sense has not traditionally been used. There is a worry, however. Most formal analytical efforts are sponsored by centralized sources and these formal analytical efforts might interfere with local innovations, which may come about through informal analysis. Perhaps what is most needed is an open, investigatory, decentralized mode of operations with analytical assists from the top down and with good lines of communication.

In Summary

As I occasionally ask a student who has finished a long presentation, "Well, what's the punch line?"

I am not sure what my punch line should be. Sure, analysis is complex and lots of errors can be made. But I guess what I want to get across most is the broad sweep of concerns and the importance in practice of keeping a sense of perspective. The aim is for you not to get caught up in an erudite analysis of some miniscule byway without giving ample thought about how you might synthesize the voluminous disparate pieces together into a coherent whole. Easier said than done. But synthesis can be somewhat helped by assuming at the outset a strong policy focus. There is a tendency in doing policy analysis (especially by prestigious committees of experts) to decompose a policy problem into compartments and to subdivide each of these compartments, and so on, until impeccably knowledgeable treatises are generated on the most esoteric of subjects—subjects which are unfortunately intriguing to scholarly, inquisitive minds. It might be helpful occasionally for analytical groups, even in their early deliberations to try to dwell a bit on the big picture: From problem formulation to policy generation to analysis to conflict resolution to advocacy to implementation and to evaluation; to try to identify those crucial issues that are at the cutting edge of the policy arguments; to examine, all along the way and not only at the end of the analysis, how the separate pieces of analysis can be fused together into a holistic, balanced, coherent, realistic, acceptable, implementable policy recommendation. Perhaps this checklist of concerns can help.